

## WISCONSIN CONSTRUCTION SPECIFICATION

### 3. EARTHFILL

#### 1. SCOPE

The work shall consist of placing the earthfill required by the drawings. This specification does not apply to the earthfill required for waste storage facilities.

#### 2. MATERIALS

All fill materials shall be obtained from required excavations and designated borrow areas. The selection, blending, routing, and disposition of materials in the various fills shall be subject to approval by Technician.

Fill materials shall contain no sod, brush, roots, frozen soil, or other perishable materials. Stones larger than two-thirds of the uncompacted layer thickness shall be removed from the materials prior to compaction of the fill.

#### 3. FOUNDATION PREPARATION

The foundation area shall be cleared of trees, stumps, roots, brush, rubbish, and stones having a maximum dimension greater than six (6) inches. Foundations shall be stripped to remove vegetation and other unsuitable materials or to the depth shown on the drawings, whichever is greater. Topsoil shall be stripped from the foundation area and stockpiled for use as a top dressing for vegetation establishment unless otherwise shown on the drawings.

Earth foundations shall be graded to remove surface irregularities and slopes steeper than 1:1.

The foundation surfaces shall be scarified parallel to the centerline of the fill to a minimum depth of 2 inches. The moisture content of the scarified materials shall be maintained as specified for the earthfill. The surface materials of the foundation shall be compacted and bonded with the first layer of earthfill as specified for subsequent layers of earthfill.

#### 4. PLACEMENT

Fill shall not be placed until the required excavation and preparation of the underlying foundation is completed and inspected and approved by the Technician. No fill shall be placed upon a frozen surface nor shall snow, ice, or frozen material be incorporated in the fill.

Fill shall be placed in approximately horizontal layers beginning at the lowest elevation of the foundation. The thickness of each layer of fill prior to compaction shall be as specified in Table 1. Materials placed by dumping in piles or windrows shall be spread uniformly to not more than the specified layer thickness prior to compaction.

Adjacent to structures, earthfill shall be placed in 4-inch lifts (prior to compaction) in a manner adequate to prevent damage to the structure and to allow the structure to gradually and uniformly assume the backfill loads.

The height of the fill shall be increased at approximately the same rate on all sides of the structure.

Placement of fill adjacent to concrete structures may begin after the concrete has cured for the minimum time specified.

Earthfill in dams, levees, and other structures designed to impound water shall be placed to meet the following additional requirements:

- a. The distribution of materials throughout each zone shall be essentially uniform, and the fill shall be free from lenses, pockets, streaks, or layers of material differing substantially in texture, moisture content, or gradation from the surrounding material.
- b. The embankment top shall be maintained approximately level during construction except for sectional construction as described in Section 7.
- c. Dam embankments shall be constructed in continuous layers from abutment to abutment, except where openings to facilitate construction or to allow passage of stream flow during construction are specified.
- d. If the surface of any layer becomes too hard and smooth to achieve a suitable bond with the succeeding layer, it shall be scarified parallel to the axis of the fill to a depth of not less than 2 inches before the next layer is placed.

## 5. CONTROL OF MOISTURE CONTENT

Fill materials shall have a moisture content sufficient to insure the required compaction. When kneaded in the hand, the soil will form a ball which does not readily separate and will not extrude out of the hand when squeezed tightly. The adequacy of the moisture content will be determined by the Technician.

Fill material or the top surface of the preceding layer of compacted fill that becomes too dry to permit suitable bond shall either be removed or scarified and wetted by sprinkling to an acceptable moisture content prior to placement of the next layer of fill.

Fill material that is too wet when deposited or the top surface of the preceding layer of compacted fill that becomes too wet shall be either removed or allowed to dry to an acceptable moisture content before compaction or placing additional layers of fill.

## 6. COMPACTION

The Contractor shall furnish and operate the types and kinds of equipment necessary to compact the fill materials.

Unless otherwise specified on the plans or approved by the Technician, compaction requirements for each layer of fill material are as shown in Table 1.

Each pass shall consist of at least one complete coverage by the wheel, track, or roller over the entire surface of the fill layer in a direction parallel to the main axis of the fill.

Adjacent to structures or in confined areas, compaction of the fill shall be accomplished by means of manually directed power tampers or plate vibrators or hand tamping, unless

otherwise specified. The Technician shall determine if adequate compaction is being achieved. Heavy equipment shall not be operated within 2 feet of any structure. Compaction by means of drop weights operating from a crane or hoist of any type will not be permitted.

#### 7. SPECIAL REQUIREMENTS FOR SECTIONAL CONSTRUCTION OF EMBANKMENTS

When sectional (or phase) construction of embankments is authorized, the work shall be accomplished in the following manner:

Each section of the embankment that is constructed in the first phase shall be so placed that a slope not steeper than 3 feet horizontal to 1 foot vertical is maintained at the end of the embankment section adjacent to the gap in construction or closure section.

Prior to placement of the closure sections, the surfaces of completed fills and excavations that will be in contact with the closure shall be stripped of all loose material, scarified, moistened, and recompacted as necessary.

**Table 1 - Equipment Compaction Requirements**

<b>Equipment Type</b>	<b>Applicable Soils<sup>1</sup></b>	<b>Maximum Fill Height<sup>2</sup> (feet)</b>	<b>Layer Thickness<sup>3</sup> (inches)</b>	<b>Minimum Passes<sup>4</sup></b>
Sheepsfoot roller (10,000 lb. min. operating weight)	ML, MH, CL, CH or SM, SC, GM, GC with >20% fines	None	9	1
Vibratory tamping roller (9,000 lb. min. operating weight)	SM, SC, GM, GC	None	9	2
Rubber-tired scraper (fully loaded)	GM, GC, SM, SC, ML, MH, CL, CH	20	9	1
Rubber-tired front end loader (fully loaded)	GM, GC, SM, SC, ML, MH, CL, CH	20	6	1
Track-type crawler (standard tracks)  30,000 lb. min.	GM, GC, SM, SC, ML, CL	10**	6	2
	SP, SW, GP, GW	6**	12	4
	CL, ML, SC, SM	15 <sup>##</sup>	3	2
less than 30,000 lb.	GM, GC, GP, GW, SM, SC, SP, SW, ML, CL	6**	6	2
Farm tractor (2,400 lb. min.)	GM, GC, SM, SC, ML, MH, CL, CH	15	6	2
Steel drum vibratory roller (10,000 lb. min.)	SP, SW, GP, GW	None**	12	2

<sup>1</sup> Unified Soil Classification System.

<sup>2</sup> Measured from the top of the fill to the lowest point along the centerline of the fill.

<sup>3</sup> Prior to Compaction.

<sup>4</sup> The Technician shall determine if adequate compaction is being achieved. Additional passes may be required.

\*\* The fill shall not have a permanent body of water stored against it.

<sup>##</sup> This method may only be used for embankments that will not have the potential for a permanent body of water stored against it that is greater than 1/4 acre in surface area or more than 6 feet deep.